Diese Website verwendet Cookies von Google, um Dienste anzubieten und den Traffic zu analysieren. Deine IP-Adresse und dein User-Agent werden zusammen mit Messwerten zur Leistung und Sicherheit für Google freigegeben. So können Nutzungsstatistiken generiert, Missbrauchsfälle erkannt und behoben und die Qualität des Dienstes gewährleistet werden.

WEITERE INFORMATIONEN OK

Saturday, July 19, 2008

Simulations of inflation expectations and oil prices

I have run some Monte Carlo simulations of hypothetical oil prices implied by long-term inflation expectations. Based on the Hotelling model of a nonrenewable resource, modified to account for inflation expectations, described here, inflation expectations are assumed to contemplate only the next 50 years, with a 1%/year discount rate. Oil in each year is assumed to be 1% less valuable to producers than in the preceeding year due to considerations of producer's time preferences, substitution, and less than perfectly secure property rights. Based on a random walk of inflation expectations (in some cases biased upward to show what happens in an era of increasing inflation expectations, in some cases downward to show happier times of declining inflation expectations), this simulation computes the net present value of the sale of a barrel of oil in 50 years based on the expected inflation over those years minus the discount rate of 1%. Note that these are not predictions I believe *will* happen, they are all explanations of what has happened or scenarios of what might happen.

The most startling and important thing you'll notice in these charts is that oil prices are an exponential function of long-run inflation expectations. Put another way, oil prices swing at a rate that is an exponential function of changes in these inflation expectations. The reason is quite straightforward -- inflation, like an interest rate, compounds. With inflation the value of oil in the ground nominally grows in value at the rate of inflation, discounted (in this model at 1%) for the factors indicated above. Thus in this model when inflation expectations are 1% or below, oil trades simply based on supply/demand fundamentals and expectations about these fundamentals, which in this model are assumed constant. Note that we assumd the discount rate (based on time preferences, substitability, property rights security, etc.) should be higher than 1%, that would only shift the exponential curve to the right, it wouldn't change its shape.

Precious metals generally move in the same way as oil in response to changing inflation expectations, but minerals that can be more readily substituted for than oil will probably not as quickly move to extreme prices. So this model and these simulations are just as useful for precious metals as they are for oil, and are somewhat less useful but still explain most of the price movements of most other minerals.

Here is a scenario similar to what we've recently experienced, with a possible further spike due to a small further increase in long-term inflation expectations, with such expectations then subsiding back to near today's value. The simulation starts out with inflations expectations at 1% (assumed to correspond to $10/barrel oil), then the expectations move to as high as 7.5%, which gives us $330/barrel oil:

Pages

- Home

About Me

Nick Szabo

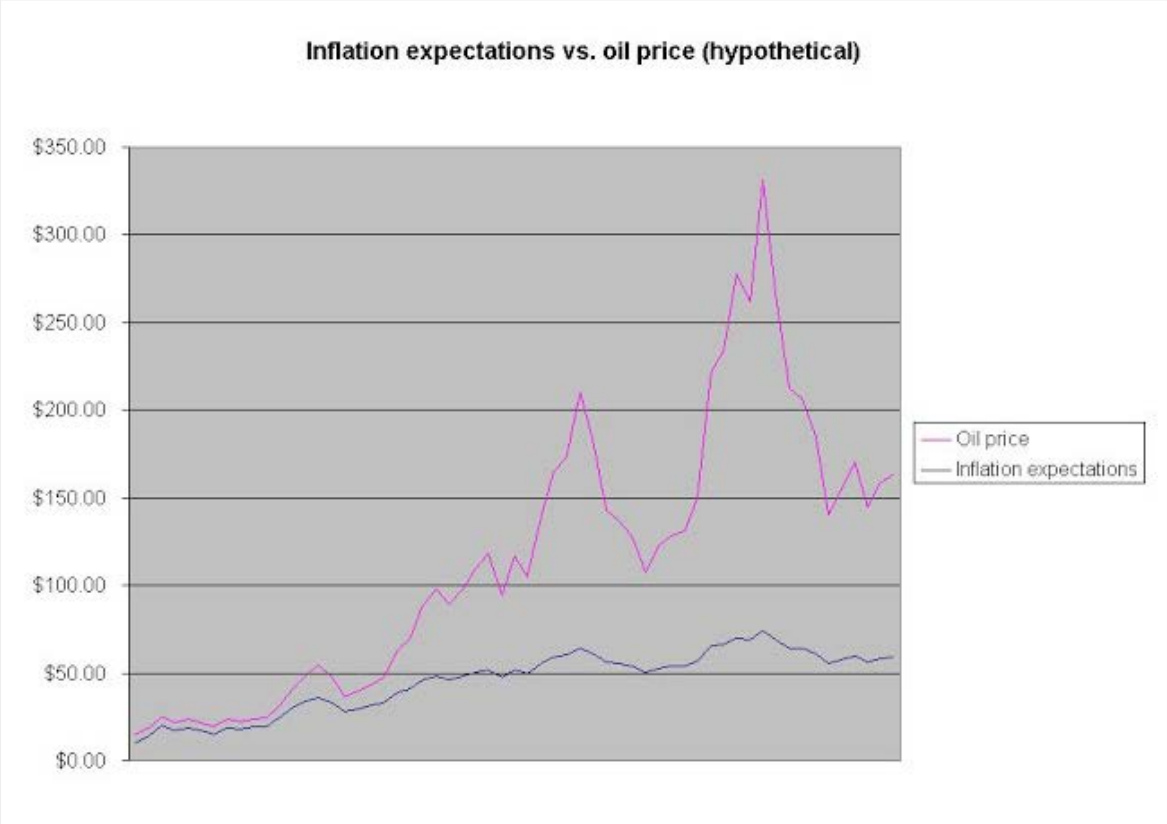
"A premier thinker about history, law and economics, and the lessons they have for security." -- Adam Shostack, Emergent Chaos

"Szabo comes out with these essays that leave me in awe." -- Brian Dunbar

"Reading material that is eclectic, challenging and endlessly fascinating." -- Sean McGrath, Propylon

"Like most blogs worth my attention, this blog is updated only infrequently. That is because the authors of blogs worth my attention only post when they have something to say that is true, relevant and not already known by their audience. Most of the human race does not have the skill to know when an idea has these three properties. The skill is particularly rare in the fields of politics and economics, which is why this blog is such a rare and valuable thing." -- Richard Hollerith

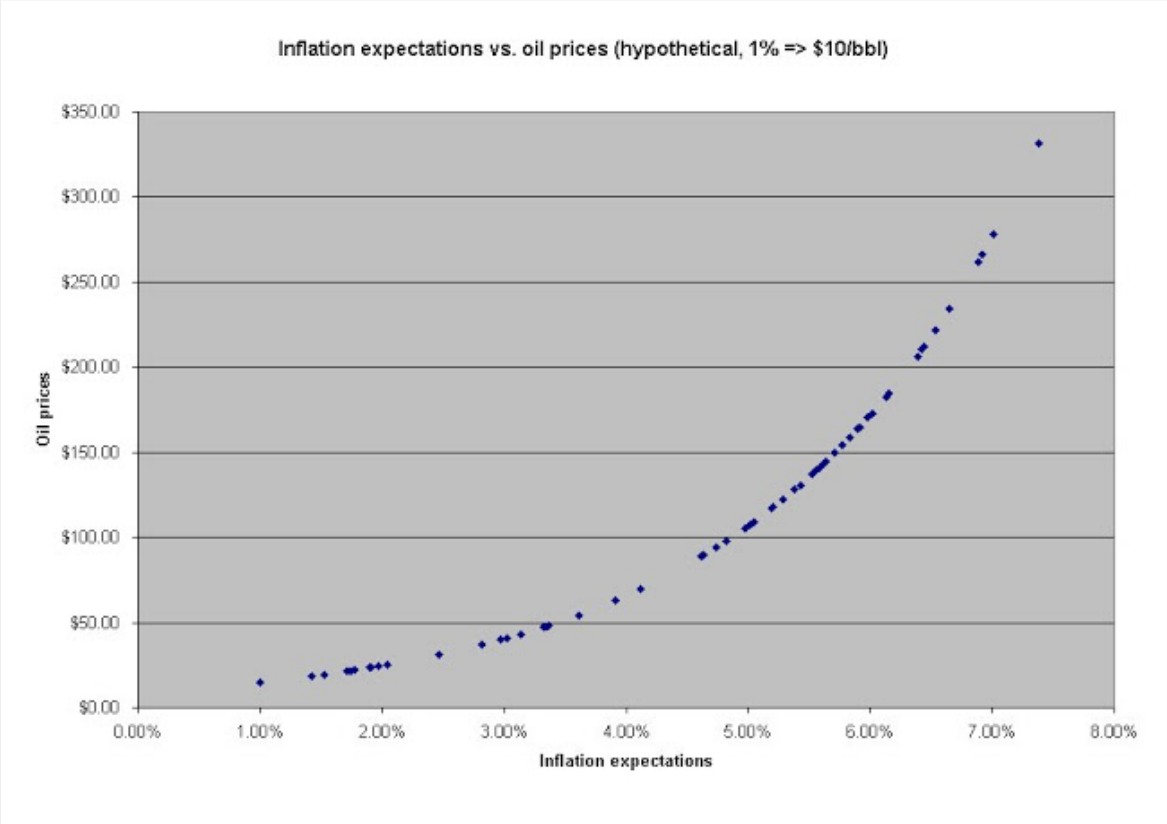
View my complete profile



Here is a more extreme scenario of what might occur during a possible U.S. federal default discussed in my previous post. At these extremes, prices of coal, natural gas, ethanol, and other near-substitutes for oil have to keep up with oil, and even the capital costs of more indirect substitutes (e.g. nuclear and alternative electricity) have to lose some of their stickiness and keep up more with oil, otherwise oil will be substituted for and prices won't reach these extremes. My model does not properly account for increased substitability as oil prices increase, which is correct over the long run (inflation eventually reaches all goods and services) but incorrect over the shorter run (because oil prices are much less sticky than most other energy prices). As a result these models probably overstate oil prices at the higher inflation expectation values. Precious metals don't

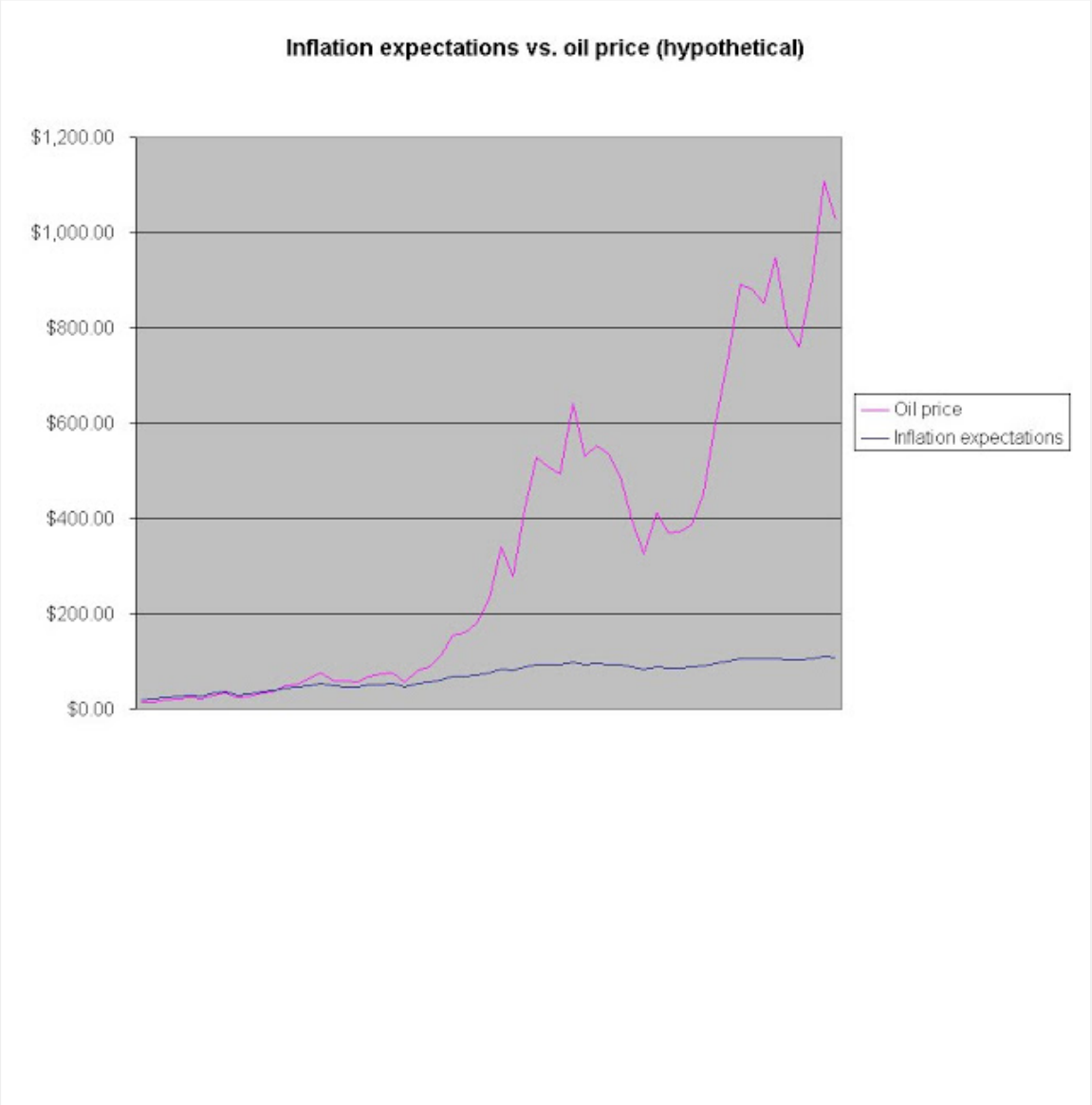
Blog Archive

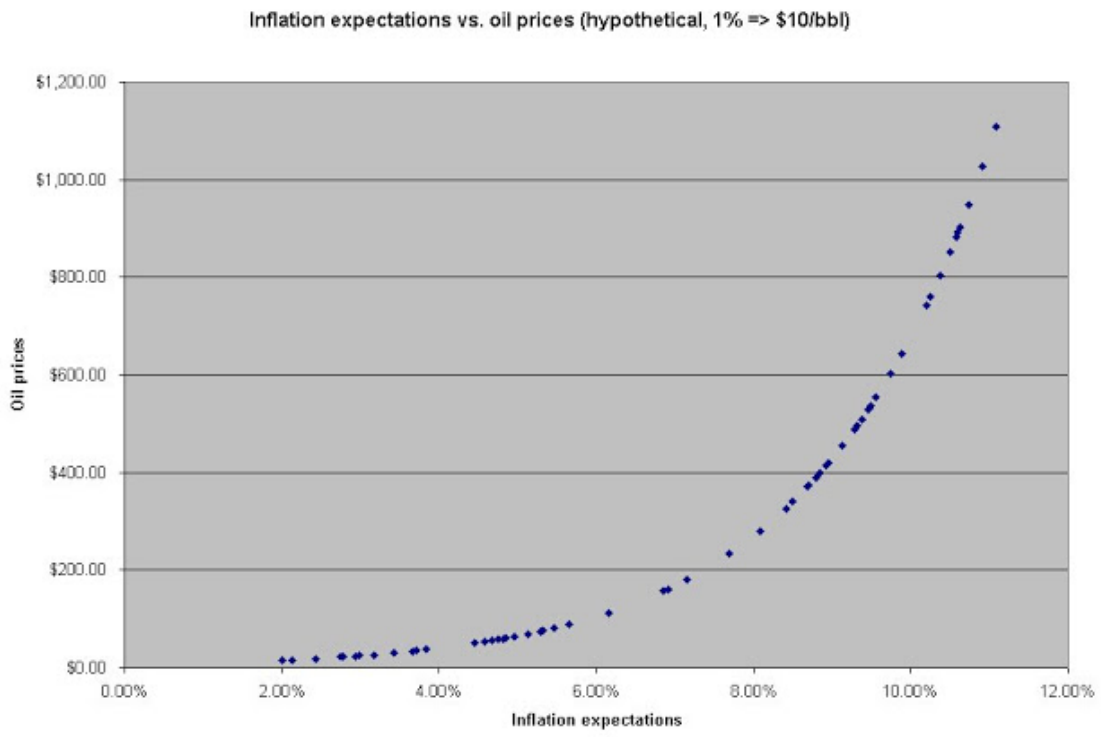
- ► 2018 (1)
- ► 2017 (3)
- ► 2016 (4)
- ► 2015 (3)
- ► 2014 (3)
- ► 2013 (3)
- ► 2012 (8)
- ► 2011 (12)
- ► 2010 (9)
- ► 2009 (29)
- ▼ 2008 (55)
  - ► December (2)
  - ► October (2)
  - ► September (4)
  - ► August (9)
  - ▼ July (4)
    - Simulations of inflation expectations and oil pric...
    - Too big to fail
    - So much for the "risk-free investment"
    - Hampton Sides sheds light on Mancur Olson and Rona...
  - ► June (6)
  - ► May (6)
  - ► April (4)
  - ► March (10)
  - ► February (5)
  - ► January (3)
- ► 2007 (47)
- ► 2006 (130)
- ► 2005 (44)

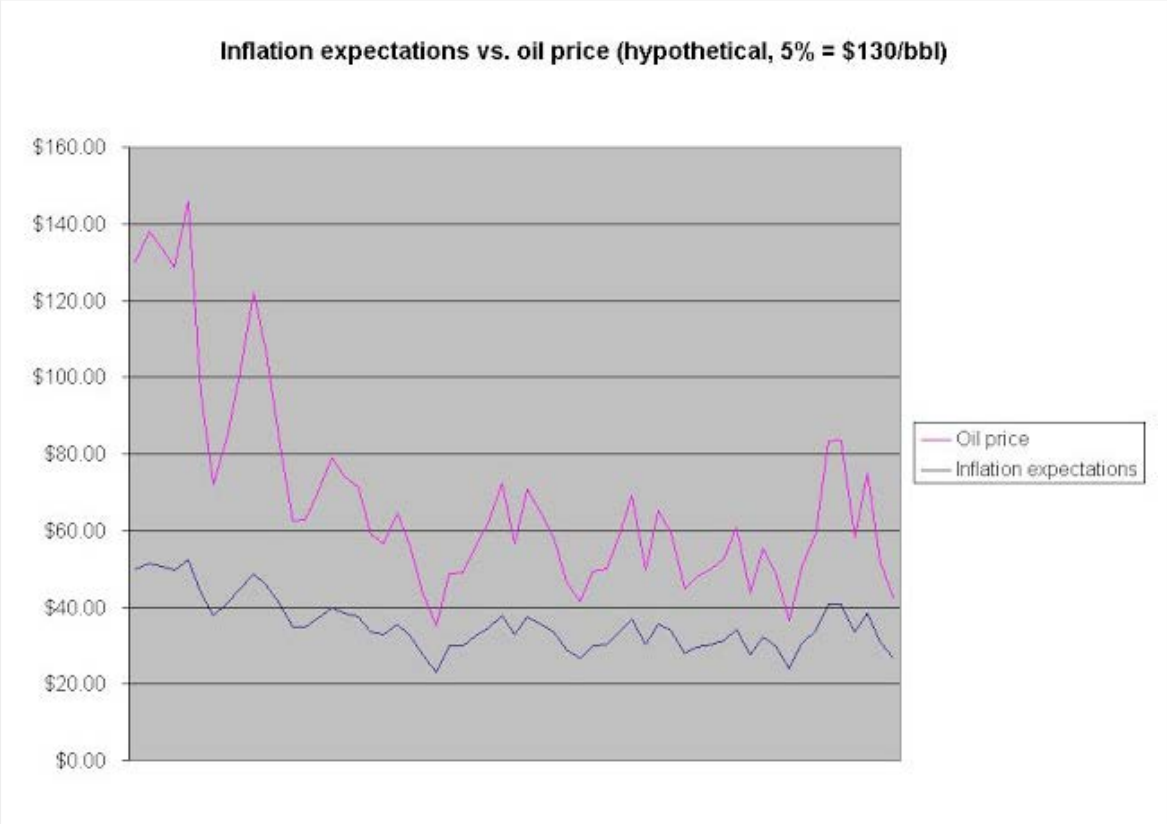


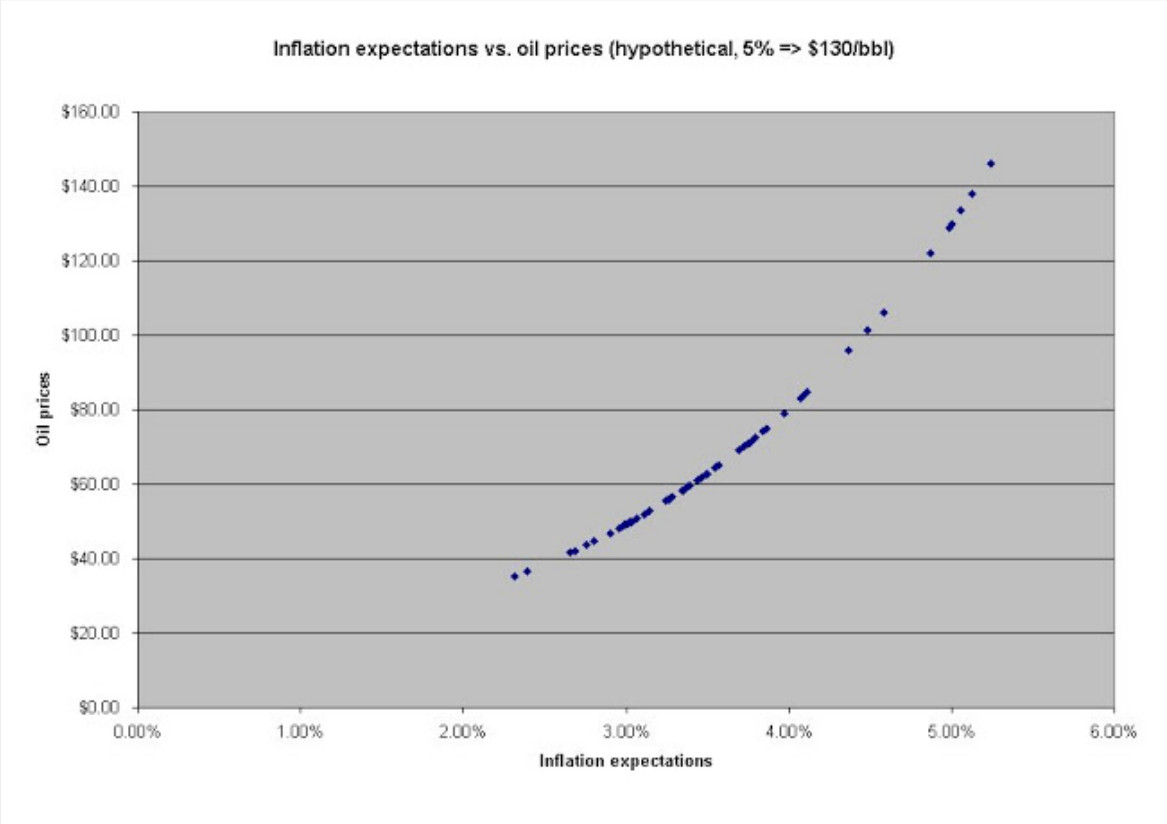
have the same problem, so hedging against the most extreme possibilities is better done with precious metals than with oil or other commodities.

Let's finish with a cheerier scenario, where oil prices start at $130/barrel (roughly what they recently have been) and then inflation expectations subside. I consider this scenario and the first scenario about equally likely, and both of these more probable than the extreme second scenario:


Inflation expectations vs. oil price (hypothetical)
$1,200.00
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
Oil price
Inflation expectations


Inflation expectations vs. oil prices (hypothetical, 1% => $10/bbl)
$1,200.00
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
Oil prices
0.00%
2.00%
4.00%
6.00%
8.00%
10.00%
12.00%
Inflation expectations


Inflation expectations vs. oil price (hypothetical, 5% = $130/bbl)
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
Oil price
Inflation expectations



Posted by Nick Szabo at 5:15 PM

No comments:

Post a Comment

Newer Post Home Older Post

Subscribe to: Post Comments (Atom)

Simple theme. Powered by Blogger.